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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,950	09/20/2005	Charles H. Winter	WSU0200PUSA	1364

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EXAMINER	
ZIMMER, ANTHONY J	
ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
12/16/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,950	WINTER ET AL.	
	Examiner	Art Unit	
	ANTHONY J. ZIMMER	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6-11,13,14,25,28-36 and 60-71* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6-11,13,14,25,28-36 and 60-71* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Claim Rejections - 35 USC § 102/103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 60-62 and 64-71 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the journal article by Aslam et al.

In regard to claims 60-62 and 64, Aslam teaches copper oxide (Cu_2O) nanoparticles containing elemental copper in ratios of elemental copper to said copper oxide of 1:1, 1:3.5, and 1:3.5. See table 1. Using the notation of the instant claims, the composition of such particles can be represented on average as Cu_3O, $Cu_{16}O_7$, and $Cu_{16}O_7$. Thus the number of O atoms is at least 0.01 times the number of copper atoms. Aslam teaches tridecylamine and lauric acid as capping agents (heteroatom ligands

bonded to the surface of the nanoparticles). Tridecylamine is an alkyl amine and lauric acid is a carboxylic acid.

Aslam is silent in regard to the total number of M atoms in each nanoparticle.

However, the nanoparticles of Aslam have the same composition as the claimed nanoparticles and have a size falling in the range of the instant invention. Thus, the number of copper atoms would fall within the broad range required by the claims. Also, the method of preparing the nanoparticles in Aslam is substantially similar to the instant method, and thus the processes would produce substantially similar products. In particular, both processes react metal ions with heteroatom donor ligands (Aslam reacts copper chloride and one of three capping agents, i.e. donor ligands) and then reduces the product thereof. See Synthesis section on page 80 of Aslam. See also MPEP 2112.01. Said nanoparticles of Aslam are capped (i.e. one or more heteroatom ligands are bonded to the surface of the nanoparticles). See Experimental section on page 80.

In regard to claims 65-67, Aslam teaches particle sizes of 4-7 nm. See conclusion section on page 89, figures 5 and 6, and Table 1.

In regard to claim 68, Aslam teaches spherical, tubular (rod-shaped), and hexagonal (polyhedral) faceting shapes. See table 1 and Figures 5 and 6.

In regard to claim 69, Aslam teaches crystalline structure and amorphous structure. See Figure 6 and the text on pages 85-86.

In regard to claims 70-71, Aslam teaches a mixture of copper oxide (Cu_2O) and elemental copper, i.e. comprising oxidation states 0 and +1. See Table 1.

Claims 60-62 and 64-71 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the journal article by Dong et al.

In regard to claims 60-62, 64-68, and 70-71, Dong et al teaches copper oxide nanoparticles including: Cu_2O/CuO nanoparticles (thus the particles have a number of oxygen atoms that is at least 0.01 times the number of metal atoms), with a size of 34 nm, containing oxidation states of +1 and +2, and has cubic (polyhedral) morphology. See Table 1 of Dong. Cu_2O particles (thus the particles have a number of oxygen atoms that is at least 0.01 times the number of metal atoms and an oxidation state of +1) with sizes in the range of the claim(s) and morphologies of cubic (polyhedral) and spherical. Dong teaches using glucose (an aldehyde) in the production which would be bonded to the surface of the produced nanoparticles.

Dong is silent as to the total number of M (copper) atoms in each nanoparticle.

However, the nanoparticles of Dong have the same composition as the claimed nanoparticles (see above), and have a size falling in the range of the instant claims. Thus, the number of metal atoms would fall within the broad range instantly claimed.

In regard to claim 69, Dong teaches a product having crystalline and amorphous domains. See Figure 2 and associated text.

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-3, 6-10, 13-14, and 60-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over the journal article by Wang et al. in view of Fan et al. "Preparation of Cu-Al2O3 nano-composite powders by electroless copper plating."

In regard to claims 1-3 and 60-64, Wang teaches ZnO, NiO, and SnO_2 nanoparticles (i.e. with an average number of oxygen atoms that are 1, 1, and 2 times the number of metal atoms respectively and having metal oxidation states of +2, +3, and +4 respectively). See Table 1 of Wang.

Wang is silent in regard to the total number of M atoms in each nanoparticle.

However, the nanoparticles of Wang have the same composition as the claimed nanoparticles and have a size falling in the range of the instant claims. Thus, the number of metal atoms would fall within the broad range required by the claims.

Wang teaches using a surfactant mediated production process using CTAB (which stabilizes metal ions during production by complexing, i.e. CTAB is a stabilizer,

see the right hand column on page 751 of Wang) and forming a nanoparticle dispersion with CTAB on the surface of the nanoparticles. See the Experimental section of Wang. Wang does not teach the heteroatom donor ligands required by the claims. However, it would have been obvious to one of ordinary skill in the art to modify Wang with Fan because Fan teaches using 2,2-bypridyl (2,2'-bipyridine) as a stabilizer (complexing agent) of metal ions in the production of a fine metal oxide containing powder. See abstract of Fan. The substitution of one known stabilizer/complexing agent for another would have been obvious to one of ordinary skill in the art in order to affect the predictable result of producing nanoparticles.

In regard to claims 6-8 and 65-67, Wang teaches average particle sizes in the range of the claim(s). See table 1.

In regard to claims 9-10 and 68-69, Wang teaches spherical, ellipsoidal, and polyhedral morphologies and crystalline domains. See Figure 2 and associated text.

In regard to claims 13-14, when using the stabilizer, in addition to the bound molecules, loosely bound molecules in the solution thereof would also be present.

Claims 1-3, 6-11, 13-14, 25, and 28-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the journal article by Dong et al in view of Fan et al.

In regard to claims 1-3, 6-9, 11, 25, 28-31, 33-34, 60-62, 64-68, and 70-71, Dong et al teaches copper oxide nanoparticles including: Cu_2O/CuO nanoparticles (thus the particles have a number of oxygen atoms that is at least 0.01 times the number of metal atoms), with a size of 34 nm, containing oxidation states of +1 and +2, and has cubic

(polyhedral) morphology. See Table 1 of Dong. Cu_2O particles (thus the particles have a number of oxygen atoms that is at least 0.01 times the number of metal atoms and an oxidation state of +1) with sizes in the range of the claim(s) and morphologies of cubic (polyhedral) and spherical.

Dong is silent as to the total number of M (copper) atoms in each nanoparticle.

However, the nanoparticles of Dong have the same composition as the claimed nanoparticles (see above), and have a size falling in the range of the instant claims. Thus, the number of metal atoms would fall within the broad range instantly claimed.

Dong teaches using glucose to stabilize copper ions to enable their reduction thus resulting in copper oxide nanoparticles with glucose on the surface thereof. See the Roles of Glucose section on page 88 of Dong.

Dong does not teach the use of the specific heteroatom donor ligands instantly claimed. However, it would have been obvious to one of ordinary skill in the art to modify Dong with Fan because Fan teaches using 2,2-bypridyl (2,2'-bipyridine) to stabilize copper ions in a powder production process in order to enable reduction. See abstract of Fan. One of ordinary skill in the art would have found it obvious to substitute one known metal ion stabilizer for another in the absence of unexpected results.

In regard to claims 10, 32, and 69, Dong teaches a product having crystalline and amorphous domains. See Figure 2 and associated text.

In regard to claims 13-14 and 35-36, when using the stabilizer, in addition to the bound molecules, loosely bound molecules in the solution would also be present.

Response to Arguments

Applicant's arguments in regard to the rejection using the Aslam in view of Fan of claims 25 and 28-36, filed 11/2/2009, have been fully considered and are persuasive. The rejection of the previously mentioned claims has been withdrawn.

Applicant's remaining arguments filed 11/02/2009 have been fully considered but they are not persuasive.

Applicant argues that Fan teaches 2,2'-bipyridine used as a stabilizer (probably for the copper ions) and that Fan does not teach the 2,2'-bipyridine being used to stabilize nanosized powders.

This was found to be unpersuasive because Fan teaches the use of 2,2'-bipyridine as a metal ion stabilizer in order to enable the reduction of the metal ions. This is also the purpose of the substances used in the primary references as suggested above, and substituting one substance with another substance known to be used for the same purpose would have been obvious to one of ordinary skill in the art. Further, Fan's disclosure of 2,2'-bipyridine used as a stabilizer in the reduction of metal ions does not show that the 2,2'-bipyridine is not present on the surface of the Cu-alumina particle produced therein. The claim does not require an amount of ligand. Thus, since the use of 2,2'-bipyridine is obviated, any amount of 2,2'-bipyridine bonded to the surface including one molecule is considered to meet the limitations of the instant claim.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. ZIMMER whose telephone number is (571)270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ajz

/Anthony J Zimmer/
Examiner, Art Unit 1793

/Steven Bos/

Primary Examiner, Art Unit 1793